CLAIMS

What is claimed is:

1. A contact structure, comprising:

a substantially planar substrate; and

at least one conductive compliant contact including:

a portion fixed within a portion of the substrate; and

at least one portion integral with the portion fixed within the portion of the substrate, laterally unsupported within a thickness of the substrate and extending beyond one side thereof.

2. The contact structure of claim 1, wherein the at least one compliant contact has a generally rectangular cross-section perpendicular to a longitudinal extent thereof.

3. The contact structure of claim 1, wherein the substrate is further configured with a recess extending peripherally about the at least one laterally unsupported portion of the at least one compliant contact.

4. The contact structure of claim 1, further comprising a conductive element operably coupled to the portion of the at least one compliant contact fixed within a portion of the substrate and extending across a side thereof opposite the side beyond which the at least one laterally unsupported portion extends.

5. The contact structure of claim 1, wherein the at least one laterally unsupported portion of the at least one compliant contact is orthogonally compliant with respect to a plane of the substrate.

6. The contact structure of claim 1, wherein the at least one laterally unsupported portion comprises two laterally unsupported portions with the portion fixed within a portion of the

substrate therebetween, each of the two laterally unsupported portions extending from the substrate on opposing sides thereof.

7. The contact structure of claim 6, wherein the substrate is further configured with a recess extending peripherally about each of the two laterally unsupported portions of the at least one compliant contact.

8. The contact structure of claim 1, further comprising:

another conductive compliant contact, including:

a portion fixed within a portion of the substrate; and

at least one portion integral with the portion fixed within the portion of the substrate, laterally unsupported within a thickness of the substrate and extending beyond another side thereof; and

a conductor extending between the one side and the another side of the substrate and operably coupled to the portion of each of the at least one compliant contact and the another compliant contact fixed within respective portions of the substrate.

9. The contact structure of claim 8, wherein the substrate is further configured on the one side with a first recess extending peripherally about the laterally unsupported portion of the at least one compliant contact and on the another side with a second recess extending peripherally about the laterally unsupported portion of the another compliant contact.

10. The contact structure of claim 1, further including a dielectric layer laterally surrounding the portion of the at least one compliant contact fixed within the portion of the substrate.

11. A contactor card for use in testing a semiconductor substrate, comprising:

a substantially planar substrate; and

a plurality of conductive compliant contacts carried by the substrate and arranged in a pattern selected for contact with contact pads carried by a semiconductor substrate to be tested, each compliant contact of the plurality including:

a portion fixed within a portion of the substrate; and

at least one portion integral with the portion fixed within the portion of the substrate, laterally unsupported within a thickness of the substrate and extending beyond one side thereof.

12. The contactor card of claim 11, wherein the plurality of compliant contacts each have a generally rectangular cross-section perpendicular to a longitudinal extent thereof.

13. The contactor card of claim 11, wherein the substrate is further configured with a recess extending peripherally about the at least one laterally unsupported portion of each of the plurality of compliant contacts.

14. The contactor card of claim 11, further comprising a conductive element operably coupled to the portion of at least some of the plurality of compliant contacts fixed within a portion of the substrate and extending across a side thereof opposite the side beyond which the at least one laterally unsupported portion extends.

15. The contactor card of claim 11, wherein the at least one laterally unsupported portion of the each of the compliant contacts is orthogonally compliant with respect to a plane of the substrate.

16. The contactor card of claim 11, wherein the at least one laterally unsupported portion comprises, in at least some compliant contacts of the plurality, two laterally unsupported portions with the portion fixed within a portion of the substrate therebetween, each of the two laterally unsupported portions extending from the substrate on opposing sides thereof.

17. The contactor card of claim 16, wherein the substrate is further configured with a recess extending peripherally about each of the two laterally unsupported portions of the at least some of the plurality of compliant contacts.

18. The contactor card of claim 11, further comprising:

another conductive compliant contact associated with each of at least some of the plurality of compliant contacts, including:

a portion fixed within a portion of the substrate; and

at least one portion integral with the portion fixed within the portion of the substrate, laterally unsupported within a thickness of the substrate and extending beyond another side thereof; and

a conductor extending between the one side and the another side of the substrate and operably coupled to the portion of each of the associated compliant contacts fixed within respective portions of the substrate.

19. The contactor card of claim 18, wherein the substrate is further configured on the one side with a first recess extending peripherally about the laterally unsupported portion of one compliant contact of the associated compliant contacts and on the another side with a second recess extending peripherally about the laterally unsupported portion of the compliant contact of the associated compliant contacts.

20. The contactor card of claim 11, further including a dielectric layer laterally surrounding the portion of the each of the plurality of compliant contacts fixed within the portion of the substrate.

21. A method of forming a compliant contact structure, comprising:

forming a contact slot at a first location extending between one side and a second, opposing side of a substrate;

filling the first contact slot with at least one conductive material to form a conductive pin;

removing substrate material from the one side of the substrate peripherally about a portion of the conductive pin and leaving another portion of the conductive pin fixed within the substrate; and

reducing a thickness of the substrate from the one side to cause an end of the portion of the conductive pin to extend therebeyond.

22. The method of claim 21, wherein forming a contact slot comprises ablating a contact slot through the substrate.

23. The method of claim 21, further comprising forming the substrate from one of a conductive material and a semiconductive material, and lining the contact slot with a layer of dielectric material prior to filling the contact slot with the at least one conductive material.

24. The method of claim 21, wherein removing substrate material comprises:

forming a contact bulk pit peripherally around the portion of the conductive pin from the one side of the substrate while leaving sidewalls of substrate material surrounding the portion of the conductive pin; and

removing the sidewalls of substrate material to expose the portion of the conductive pin.

25. The method of claim 24, wherein forming a contact bulk pit is effected by laser ablation.

26. The method of claim 24, wherein removing the sidewalls of substrate material is effected by chemical etching.

27. The method of claim 26, wherein reducing a thickness of the substrate from the one side to cause an end of the portion of the conductive pin to extend therebeyond is effected by chemical etching concurrently with removing the sidewalls of substrate material.

28. The method of claim 21, wherein reducing a thickness of the substrate from the one

side to cause an end of the portion of the conductive pin to extend therebeyond is effected by chemical etching.

29. The method of claim 21, further comprising forming a conductive element contiguous with the portion of the conductive pin fixed with the substrate and on the second, opposing side of the substrate.

30. The method of claim 21, further comprising removing substrate material from the second, opposing side of the substrate peripherally about yet another portion of the conductive pin and reducing a thickness of the substrate from the second, opposing side to cause an end of the yet another portion of the conductive pin to extend therebeyond.

31. The method of claim 30, wherein removing substrate material from the second, opposing side of the substrate comprises:

forming a contact bulk pit peripherally around the yet another portion of the conductive pin from the second, opposing side of the substrate while leaving sidewalls of substrate material surrounding the yet another portion of the conductive pin; and

removing the sidewalls of substrate material to expose the yet another portion of the conductive pin.

32. The method of claim 31, wherein forming a contact bulk pit is effected by laser ablation.

33. The method of claim 32, wherein removing the sidewalls of substrate material is effected by chemical etching.

34. The method of claim 33, wherein reducing a thickness of the substrate from the second, opposing side to cause an end of the yet another portion of the conductive pin to extend therebeyond is effected by chemical etching concurrently with removing the sidewalls of substrate material.

35. The method of claim 21 further comprising:

forming second and third contact slots at second and third locations adjacent the contact slot and extending between a first side and second side of a substrate;

filling the second and third contact slots with conductive material to form second and third conductive pins; and

removing substrate material from the second, opposing side of the substrate peripherally about a portion of the second conductive pin and leaving another portion of the second conductive pin fixed within the substrate;

reducing a thickness of the substrate from the second, opposing side to cause an end of the portion of the second conductive pin to extend therebeyond; and

operably coupling the another portion of the conductive pin with the another portion of the second conductive pin by extending a conductive trace between the another portion of the conductive pin and the third conductive pin and another conductive trace between the another portion of the second conductive pin and the third conductive pin.

36. A method of testing a semiconductor substrate, comprising:

placing a substantially planar semiconductor substrate adjacent and substantially parallel to a substantially planar substrate of a contactor card;

aligning at least one contact pad of the substantially planar semiconductor substrate with a compliant contact of a compliant contact structure carried by a contactor card, the compliant contact structure including:

a compliant contact, including:

a portion fixed within a portion of the substrate; and

at least one portion integral with the portion fixed within the portion of the substrate, laterally unsupported within a thickness of the substrate and extending beyond one side thereof;

pressing the semiconductor substrate against the contactor card substantially transversely to a plane of the contactor card substrate to cause and end of the at least one laterally unsupported portion extending beyond the one side of the contactor card substrate to contact the at least one contact pad of the

semiconductor substrate and induce flexure of the at least one laterally unsupported portion; and

applying at least one test signal from a tester operably coupled to the contactor card through the compliant contact.

37. The method of claim 36, further comprising arresting flexure of the at least one laterally unsupported portion by contacting the one side of the contactor card substrate with the semiconductor substrate.

38. The method of claim 37, further comprising at least partially receiving the at least one contact pad of the semiconductor substrate within a recess in the one side of the contactor card substrate peripherally surrounding the at least one laterally unsupported portion.

39. A semiconductor substrate testing system, comprising:

a contactor card configured for operable coupling with a semiconductor substrate, including:

a substantially planar substrate; and

a plurality of conductive compliant contacts carried by the contactor card substrate and arranged in a pattern selected for contact with contact pads carried by a semiconductor substrate to be tested, each compliant contact of the plurality including:

a portion fixed within a portion of the substrate; and

at least one portion integral with the portion fixed within the portion of the substrate, laterally unsupported within a thickness of the substrate and extending beyond one side thereof; and

a tester operably coupled to the contactor card and configured to apply test signals to the semiconductor substrate through the contactor card.

40. The testing system of claim 39, wherein the plurality of compliant contacts each have a generally rectangular cross-section perpendicular to a longitudinal extent thereof.

41. The testing system of claim 39, wherein the contactor card substrate is further configured with a recess extending peripherally about the at least one laterally unsupported portion of each of the plurality of compliant contacts.

42. The testing system of claim 39, further comprising a conductive element operably coupled to the portion of at least some of the plurality of compliant contacts fixed within a portion of the contactor card substrate and extending across a side thereof opposite the side beyond which the at least one laterally unsupported portion extends.

43. The testing system of claim 39, wherein the at least one laterally unsupported portion of the each of the compliant contacts is orthogonally compliant with respect to a plane of the contactor card substrate.

44. The testing system of claim 39, wherein the at least one laterally unsupported portion comprises, in at least some compliant contacts of the plurality, two laterally unsupported portions with the portion fixed within a portion of the contactor card substrate therebetween, each of the two laterally unsupported portions extending from the contactor card substrate on opposing sides thereof.

45. The testing system of claim 44, wherein the contactor card substrate is further configured with a recess extending peripherally about each of the two laterally unsupported portions of the at least some of the plurality of compliant contacts.

46. The testing system of claim 39, further comprising:

another conductive compliant contact associated with each of at least some of the plurality of compliant contacts, including:

a portion fixed within a portion of the contactor card substrate; and

at least one portion integral with the portion fixed within the portion of the contactor card substrate, laterally unsupported within a thickness of the contactor card substrate and extending beyond another side thereof; and

a conductor extending between the one side and the another side of the contactor card substrate and operably coupled to the portion of each of the associated compliant contacts fixed within respective portions of the substrate.

47. The testing system of claim 46, wherein the contactor card substrate is further configured on the one side with a first recess extending peripherally about the laterally unsupported portion of one compliant contact of the associated compliant contacts and on the another side with a second recess extending peripherally about the laterally unsupported portion of the compliant contact of the associated compliant contacts.

48. The testing system of claim 39, further including a dielectric layer laterally surrounding the portion of the each of the plurality of compliant contacts fixed within the portion of the contactor card substrate.